START

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SCOPE OF WORK
REMEDIAL INVESTIGATION/ FEASIBILITY STUDY
Siemens Nuclear Power Corporation
Richland, Washington Facility

January 7, 1992

Prepared for

Siemens Nuclear Power Corporation
2101 Horn Rapids Road
Richland, Washington 99351

Prepared by

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NOV 1992

SIEMENS

January 14, 1992

U.S. Army Corp of Engineers
Attn: John Stewart, Project Manager
Walla Walla District
Walla Walla WA 99362

Dear Mr. Stewart:

Item number 1 on the agenda for the January 21 meeting is the SNP RI/FS Scope of Work. Enclosed are 5 copies of that work scope which has been prepared by Geraghty & Miller. SNP does not intend to formally present the document nor ask for comments as we did with the Phase I Ground Water plan so this will be the only scheduled opportunity for discussion. This document merely outlines the various tasks which must be completed to arrive at the Remedial Investigation/Feasibility Study Report. Individual Tasks within this work scope such as the Source Evaluation Work Plan, Phase II Groundwater Study Work Plan, and others will be formally presented and comments accepted.

Very truly yours,

C. W. Malody, Manager
Regulatory Compliance

CWM:clp

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C.W. Malody

Manager
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Available in Fed.

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INTRODUCTION

Siemens Nuclear Power Corporation (SNP) has elected to undertake an independent action under the Washington Model Toxics Control Act (MTCA) to investigate the potential presence of hazardous substances in soils and ground water at its nuclear fuels fabrication facility at 2101 Horn Rapids Road, Richland, Washington (Figure 1). The site is immediately adjacent to the Horn Rapids Landfill (HRL) on the U.S. Department of Energy (USDOE) property. The HRL is being investigated as a Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA) National Priorities List (NPL) site by the USDOE. The active (fenced) portion of the SNP site (the site) is approximately 42 acres in size and includes a UO_2 facility, an office complex, several warehouses and shops, an ammonia recovery facility (ARF), 5 process wastewater lagoons, and 38 ground-water wells (12 new, 26 old) to monitor the ground-water quality. Analytical results from ground-water sampling since 1973 have shown elevated concentrations of nitrate, ammonia, fluoride, and radionuclides in ground water from selected wells. Analytical results from ground-water sampling since 1987 have shown elevated concentrations of trichloroethylene (TCE) in ground water from selected wells.

On SNP's behalf, Geraghty & Miller, Inc. is currently conducting a Phase I Ground-Water Study and a soils investigation. Both studies are being conducted to further define the distribution of contaminants in the subsurface, with the soils investigation focused on the area to the north of the lagoons around the ARF. Both studies are being done as independent actions under the MTCA to satisfy WAC 173-340-50(6)(c)(ii) and (iii) (field studies for soils and ground water, respectively).

At SNP's request, Geraghty & Miller has prepared the scope of work (SOW) to carry out additional environmental studies at the site. The purpose of this SOW is to conduct the tasks necessary to fulfill the remaining MTCA requirements for a remedial investigation/feasibility study (RI/FS) (WAC 173-340-350), selection of cleanup actions (WAC 173-340-360[1]-[4]), and selection of cleanup standards (WAC 173-340-720 and

740) for contaminated ground water and soils. In addition to satisfying MTCA requirements, this SOW was designed to be consistent with the CERCLA National Contingency Plan (NCP)(40 CFR 300.430) requirements for a RI/FS.

This SOW consists of a description of the technical approach, a discussion of tasks to be completed and a schedule for completing those tasks. Two of the tasks proposed in this SOW (Tasks 3 and 5) are not discussed in detail. These are the source evaluation and Phase II ground-water implementation tasks. These tasks cannot be scoped until other tasks (Tasks 1, 2, and 4) are completed. They are included in this SOW as they are integral parts of the RI/FS and inclusion will assist in understanding how all the tasks fit together.

Other tasks to fulfill MTCA requirements are already in progress: the Phase I Ground-Water Study and the ARF soils study. The results of these studies will be integrated into the RI/FS. Additional tasks may be necessary to fulfill MTCA requirements. These tasks can be scoped out as appropriate when necessary.

TECHNICAL APPROACH

The technical approach proposed in this SOW is a series of tasks to be undertaken to fulfill the MTCA applicable requirements for a RI/FS ([WAC 173-340-350], selection of cleanup standards [WAC 173-340-720 and 740], and evaluation and selection of cleanup actions [WAC 173-340-360]), and CERCLA NCP requirements (40 CFR 300.430).

Tasks 1, 2, 3, 4, and 5 constitute the RI phase of the study. The purpose of this phase is to document environmental site conditions and to provide data that can be used to conduct a risk assessment and to select remedial alternatives to clean up the site, if necessary. Tasks 1, 2, and 3 are hazardous substance source investigation tasks. Task 1 provides for a review of available information regarding potential sources of hazardous

substances in the environment. Task 2 provides for the development of a work plan to evaluate whether the potential hazardous substance sources are present. This work plan will focus on sampling of soils for the presence of hazardous substances and determining whether any facilities on site are on-going sources of hazardous substances. Task 3 will be the implementation of the work plan.

Tasks 4 and 5 provide for further study of the ground water and hydrogeologic characteristics of the site and will be based on initial results of the Phase I Ground-Water Study and the hazardous substance source investigation results. Task 4 is the development of a Phase II Ground-Water Study, which will include installation of a large-diameter test well and observation wells for use in conducting a pumping test to evaluate aquifer characteristics. This information will be essential to predicting ground water contaminant migration pathways and rates and to analyzing various remedial action alternatives for ground water.

Once the distribution of hazardous substances in the environment is known, a risk assessment can be performed (Task 6). This will identify hazardous substances of concern in soils and ground water, their migration pathways, their potential toxicity and the potential cleanup level options under MTCA. The risk assessment will be performed in a manner consistent with U.S. Environmental Protection Agency (USEPA) guidelines for CERCLA risk assessment. More details regarding the risk assessment will be developed and circulated for comment at a later date.

After the RI and risk assessment have been completed, the process for selecting a remedy can begin. This involves two steps: (1) establishing cleanup standards for the site for each hazardous substance and media of concern, and (2) identifying a recommended remedial action from among those that satisfy cleanup standards and regulatory requirements.

The FS part of the study is the decision-making process that results in the selection of the recommended remedial alternatives to deal with the hazardous substances of concern in soils and ground water at the site. The proposed FS first identifies applicable cleanup standards and then identifies the cleanup technologies available to meet those standards. Those cleanup technologies that can meet cleanup standards are assembled into different remedial alternatives and then evaluated against the state and federal criteria for selecting a remedy. A cleanup action will then be selected which can attain the applicable cleanup standards and fulfill MTCA and CERCLA NCP remedy selection criteria.

Tasks 7 and 8 comprise the FS phase of the SNP study. Task 7 provides for the establishment of cleanup standards which includes identifying potential MTCA cleanup levels (Method A, B, C), identifying MTCA points of compliance and determining other applicable state and federal laws. Task 8 provides for the identification and evaluation of cleanup actions and the selection of the recommended remedial alternative.

Task 9 is RI/FS report preparation. Though SNP is undertaking an independent action, SNP will submit a RI/FS report to Ecology and USEPA. SNP will coordinate that report submission with USDOE's preparation of the final RI/FS for the Horn Rapids Landfill (HRL).

The following discusses the tasks in more detail and identifies the major activities to be conducted under each task.

TASKS

Task 1: Hazardous Substance Source Identification

This task provides for the identification of potential hazardous substance sources of contamination in soils and ground-water through a review of existing information. Identification of these potential sources of contamination is necessary to define the hazardous substances of concern in soils and/or ground water and their geographical location. Hazardous substance source identification is also essential to the selection of cleanup standards and the development of appropriate, effective remedial actions. Hazardous substance source identification will consist of a review of existing data/information regarding topics such as chemicals used on site, spill/leak history, land use, etc. Specific activities include:

- Review of available reports relating to potential hazardous substances and the environment.
- Review of Nuclear Regulatory Commission (NRC) inspection reports.
- Review of other relevant data.
- Preparation of a letter report identifying potential hazardous substance source locations and potential hazardous substances of concern.

Task 2: Hazardous Substance Source Evaluation Work Plan and Cost Estimate

A hazardous substance source evaluation work plan will be developed based upon the results of Task 1. This work plan will identify sites for soil sampling, general locations and depths of borings, contaminants to be analyzed, and methodologies for drilling. The objective of the study will be to assess the nature and extent of soils contamination at those potential contaminant source sites identified in Task 1 that are worthy of further investigation. The main activities will include the following:

- The development of a contaminant source evaluation work plan.
- The development of a cost estimate.

Task 3: Implementation of Source Evaluation Work Plan

Upon approval of SNP, Geraghty & Miller will implement the work plan. The work plan will include provisions for soil sampling, possibly additional ground-water monitoring and also possibly activities to assess whether there are on-going sources of hazardous substances. A report will be written summarizing the results for inclusion as a chapter in the RI/FS report.

Task 4: Phase II Ground-Water Study Work Plan and Cost Estimate

A Phase II Ground-Water Study will be necessary to generate all the hydrogeological data essential to fulfill regulatory requirements and to evaluate and select appropriate remedial actions and cleanup standards. At a minimum, it is anticipated that a Phase II study will involve drilling a large-diameter test well and some observation wells so as to be able to conduct a pumping test to assess aquifer characteristics. The location of this large-diameter test well will be determined from the Phase I Ground-Water Study first-quarter ground-water analytical results and other relevant data. Phase II may also include additional monitoring wells to further refine the understanding of the flow system and/or the distribution of contamination in ground

water. Phase II will include development of a ground-water model for use in evaluating potential cleanup alternatives.

Based upon initial Phase I ground-water quality results and the hazardous substance source evaluation field work, analytical parameters may be re-evaluated and the monitoring program revised.

Task 4 provides for the development of the Phase II Ground-Water Study Work Plan and cost estimate. The major activities of this task include the following:

- Interpretation of water quality data from the initial rounds of sampling of the new monitoring wells.
- Identification of new large-diameter test well and observation well locations and additional monitoring wells if necessary and well construction details.
- Identification of aquifer test procedures.
- Development of a work plan to implement the Phase II Ground-Water Study.
- Development of a cost estimate to implement Phase II.

Task 5: Implementation of Phase II Ground-Water Study

Upon approval by SNP, Phase II will be implemented. Data that are generated from the Phase II study will be presented and interpreted in Task 9, RI/FS Report Preparation.

Task 6: Risk Assessment

Once analytical results of the soil and ground-water studies are available, Geraghty & Miller will prepare a risk assessment to evaluate the potential threat to human health and the environment. The results of the risk assessment will be used to calculate cleanup levels, as appropriate. All methodologies and calculations used in the exposure and risk assessment will be consistent with USEPA guidelines for health and environmental assessment for CERCLA , and will be documented in the report at a level of detail consistent with regulatory agency requirements. State of Washington guidelines for conducting risk assessments, WAC 173-340-350(6)(d) and WAC 173-340-708, 720, and 740 (MTCA cleanup standards risk assessment criteria for ground and soils) will also be considered in the risk assessment.

The purpose of risk assessment is to evaluate the site under the no-action alternative (baseline conditions), that is, in the absence of remedial (corrective) action. The assessment will realistically evaluate current and reasonably likely future conditions at the site. The following activities will be performed to prepare a risk assessment consistent with USEPA and State of Washington guidelines:

- Identification of constituents of concern in soils and ground water. A database consisting of data collected during the RI will be compiled. The database will be used to calculate geometric mean or arithmetic average contaminant concentrations for each medium under consideration, depending on the distribution of the data, for use in later tasks. Non-detected values will be included in the geometric mean or arithmetic average calculations as one-half the detection limit. Data summary sheets will be compiled and will include the frequency of detection and the range of positive detected concentrations.

Using the statistical analysis, constituents of concern will be selected to focus the exposure evaluation on the constituents posing the greatest potential risks to human health and the environment. Constituents of concern will be selected following agency guidance and considering detection frequency and concentration, constituent toxicity, and chemical and physical properties related to environmental mobility and persistence.

- Exposure Assessment. This will provide information on the constituents to be evaluated, identify potential human and environmental receptors, exposure pathways, and exposure point concentrations, and quantify the level of intake resulting from the release of constituents from the site.

- Toxicity Assessment. This will comprise brief summary profiles on the toxicity of each of the constituents of concern selected in the exposure assessment. USEPA's Integrated Risk Information Service (IRIS) will be consulted to obtain the most current information.

  The ecotoxicity of the constituents of concern will be evaluated based on a review of the available literature. Available toxicity information (e.g., concentration which is lethal to 50 percent of test organisms [LC_{50}s]) and criteria (e.g., Federal Water Quality Criteria [FWQC]) will be identified under this task and summarized in brief profiles.

- Risk Characterization. This will consist of an analysis of the likelihood and severity of potential adverse effects in humans as a result of exposure to the constituents of concern. Risk estimates

will integrate the constituent exposure estimates derived in the exposure assessment with the health criteria values identified in the toxicity assessment. For non-carcinogens, exposure data will be compared to USEPA-established reference doses. For carcinogens, exposure data will be compared to cancer slope factors.

Potential adverse impacts to biological receptors in the aquatic and terrestrial communities will be evaluated qualitatively from the data described above. Where possible both acute and chronic effects will be evaluated. The assessment will draw upon previously collected information for the site. A qualitative evaluation of potential exposures to constituents discharging to the Columbia River will be included, as appropriate, based on the results of the ground-water modeling.

- Baseline Risk Assessment Report. A draft Baseline Risk Assessment Report will be prepared as a chapter to be included in the RI/FS report and will include the following:

  - Brief site description, including location, history, geology, hydrogeology, demographics, and meteorology.

  - Data evaluation, including investigated media and constituents of concern.

  - Human and environmental exposure evaluation, including receptor populations and exposure pathways.

  - Risk evaluation, including exposure point concentrations, non-carcinogenic health effects, and carcinogenic risks.

- Summary and conclusions.

- Calculation of potential MTCA cleanup levels under WA 173-340-720 and 740. Cleanup levels for soil and ground water will be calculated for the exposure scenarios identified as causing a potential threat to human health.

Task 7: Selection of Cleanup Standards

One of the major decisions made during the RI/FS process is the selection of cleanup standards. This task takes the results of the risk assessment (Task 6) and evaluates the various cleanup level options with respect to compliance point options and applicable state and federal laws. A cleanup standard will be selected based upon these evaluations. General activities will include:

- Identification and evaluation of cleanup levels for soils and ground water (i.e., the concentrations for each contaminant of concern available under MTCA Methods A, B, and C) developed under Task 6.

- Identification of applicable state and federal laws under MTCA and ARARs under CERCLA.

- Identification and evaluation of compliance points at which the cleanup levels must be met in soils and ground water.

- Analysis of cleanup level/compliance point options (cleanup standards).

- Preparation of a letter report to present cleanup standard options.

- Selection of a cleanup standard.

Task 8: Identification and Evaluation of Cleanup Actions and Selection of the Recommended Alternative

The activities proposed for this task are consistent with MTCA and NCP criteria for remedy selection (WAC 173-340-360[1]-[4] and 40 CFR 300.430[e], respectively).

- Establishment of remedial action objectives. This will involve establishing remedial action objectives for the media and contaminants of concern. These objectives will be driven by the results of the risk assessment (Task 6) and the selected cleanup standards (Task 7).

- Identification of general response actions. General response actions will be developed to attain the remedial action objectives and will be used to identify specific technologies.

- Identification and evaluation of technologies to attain remedial objectives. Once general response actions are identified, technologies that may be able to attain the remedial action objectives will be identified for each medium (soil and ground water) and screened with respect to factors such as feasibility for the site, logistics, etc.

- Development of alternative remedial actions. Those technologies identified as capable of attaining remedial action objectives will be assembled into alternative remedial actions that may be appropriate for the site.

- Preliminary analysis of alternatives with respect to MTCA and NCP criteria. Once cleanup standards are assembled into various alternative remedial actions, a preliminary analysis will be done to assess their ability to meet MTCA and NCP remedy selection criteria. A comparative analysis will also be done with respect to NCP criteria for evaluation. The purpose of this activity is to identify the optimum alternatives for further evaluation.

- Detailed analysis of remaining alternatives. A detailed analysis will be conducted on the limited number of alternatives that represent viable approaches to remediation. This will consist of a detailed analysis of individual alternatives against the nine NCP criteria (overall protection; compliance with ARARs; long-term effectiveness and permanence; reduction of toxicity, mobility, and volume though treatment; short-term effectiveness; implementability; cost; and state and community acceptance)

- Comparative analysis of alternatives according to NCP criteria. This activity is part of the detailed analysis and consists of a comparative analysis of the relative performance of each alternative against the nine NCP criteria.

- Selection of the recommended alternative. An alternative will be recommended based upon the detailed and comparative analysis of the viable options.

- Preparation of chapter in RI/FS report documenting the analysis and the decision.

Task 9: RI/FS Report

This task involves the preparation of the RI/FS report. The report will include sections developed in previously conducted tasks in addition to new sections. It is intended that the report be consistent with MTCA requirements for an RI/FS report (WAC 173-340-350[6]) and include sections on the following general categories (the information in parentheses indicates the task in which the section will be written):

- General facility information (Task 9)
- Land use (Task 9)
- Natural resources and ecology (Task 9)
- Hazardous substance source identification and assessment (Task 3)
- Geology and ground water (Phase I Ground-Water Study and Task 9)
- Ground-water quality (Phase I Ground-Water Study and Task 9)
- Risk assessment (Task 6)
- Cleanup standards (Task 7)
- Remedial alternatives (Task 8)
- Preferred remedial alternative (Task 8)

SCHEDULE

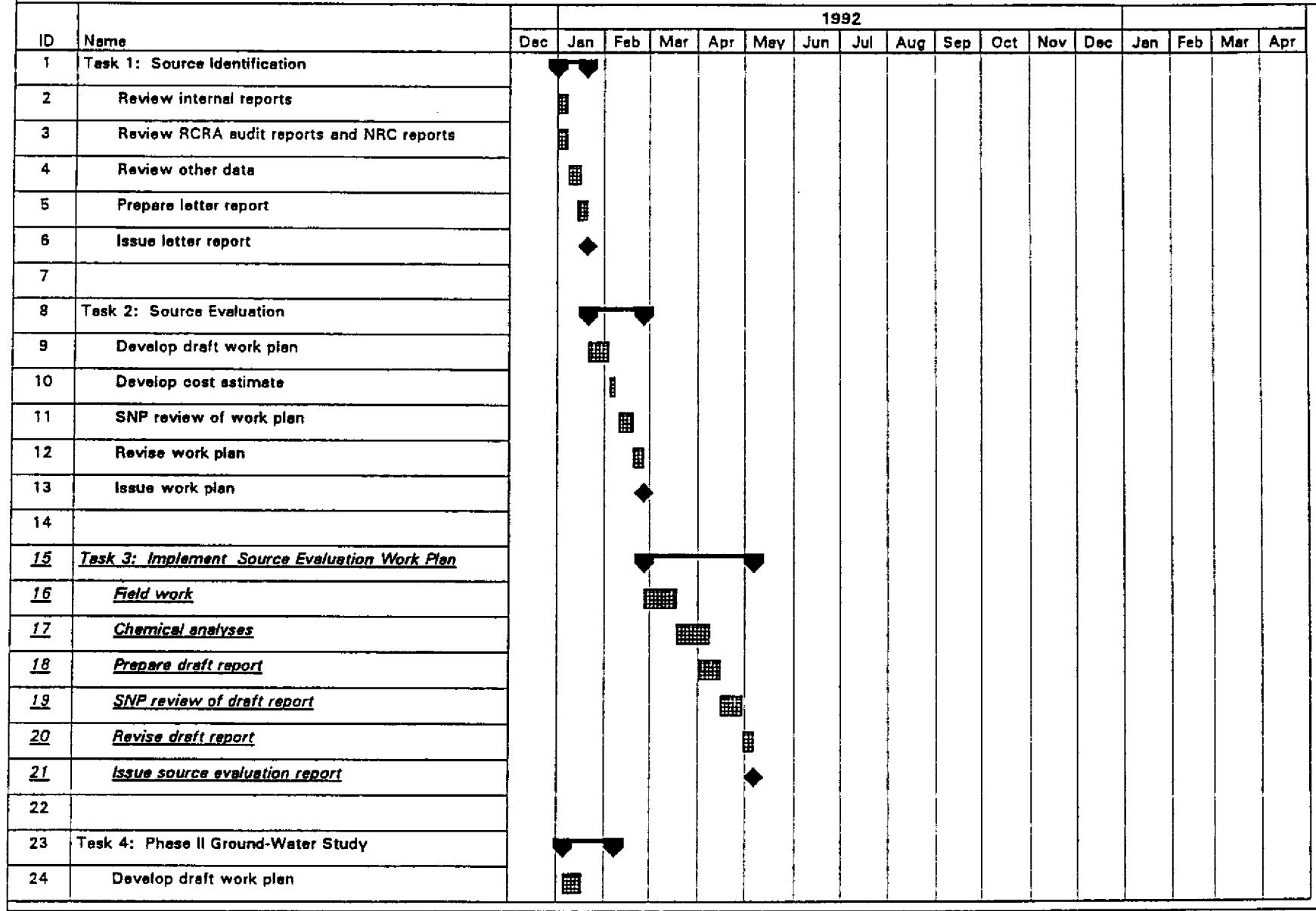
This project is estimated to require 12 months to complete. A preliminary schedule for the project is provided in Figure 1. The intent of this schedule is to have a remedy selected by September 1992, a draft RI/FS report available by October 1992, and a final report in December 1992.

FIGURE

PRELIMINARY SCHEDULE FOR RI/FS

Siemens Nuclear Power Corporation

Richland, Washington



ID	Name
1	Task 1: Source Identification
2	Review internal reports
3	Review RCRA audit reports and NRC reports
4	Review other data
5	Prepare letter report
6	Issue letter report
7	
8	Task 2: Source Evaluation
9	Develop draft work plan
10	Develop cost estimate
11	SNP review of work plan
12	Revise work plan
13	Issue work plan
14	
15	*Task 3: Implement Source Evaluation Work Plan*
16	*Field work*
17	*Chemical analyses*
18	*Prepare draft report*
19	*SNP review of draft report*
20	*Revise draft report*
21	*Issue source evaluation report*
22	
23	Task 4: Phase II Ground-Water Study
24	Develop draft work plan

Project: RI/FS
Date: 12/2/91

Critical
Noncritical
Progress
Milestone
Summary

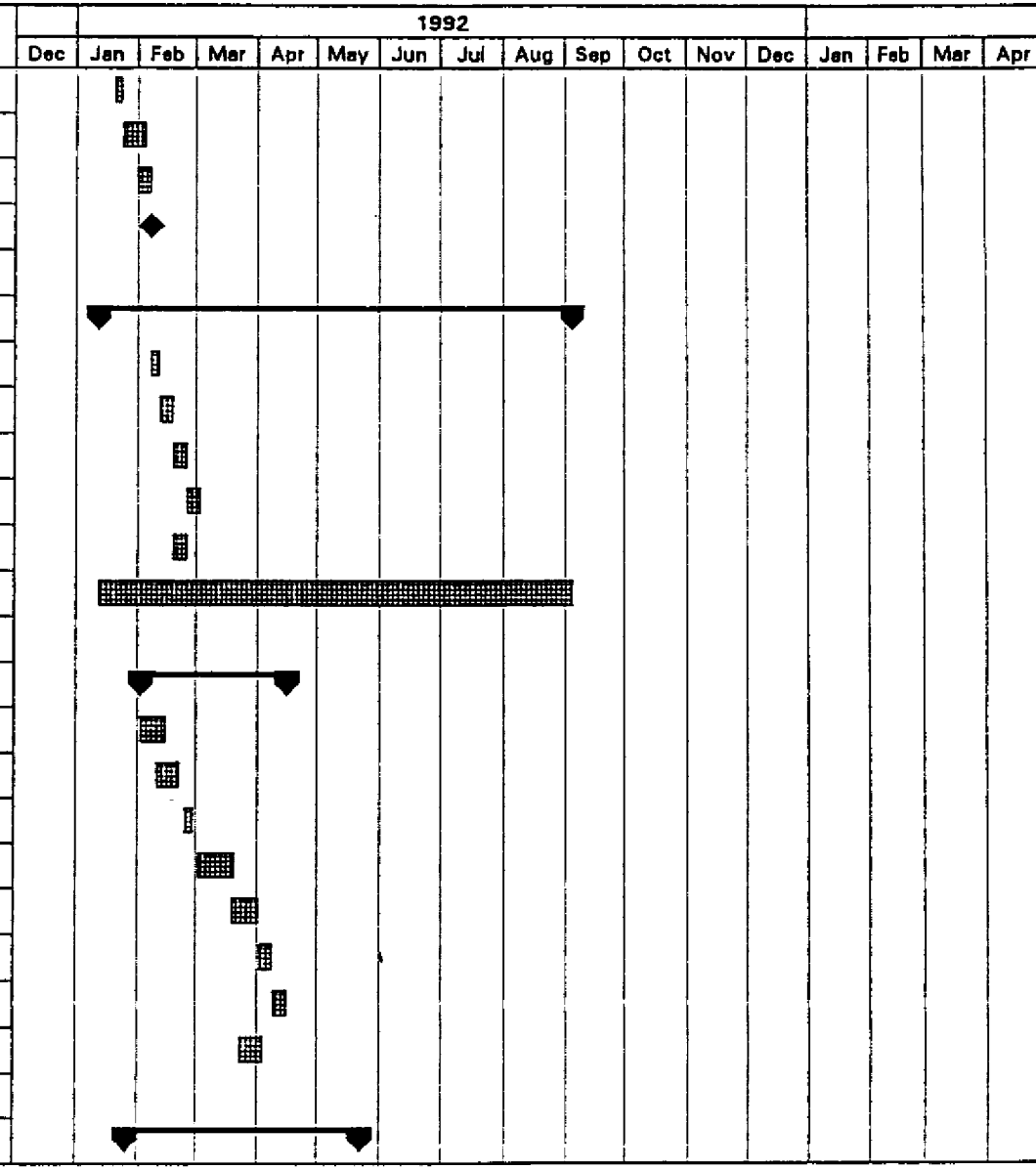
Italicized tasks are not budgeted with this project

Figure 1

PRELIMINARY SCHEDULE FOR RI/FS

Siemens Nuclear Power Corporation
Richland, Washington

ID	Name
25	Develop cost estimate
26	SNP review of draft work plan
27	Revise work plan
28	Issue work plan
29	
30	*Task 5: Implement Phase II GW Study Work Plan*
31	*Design pumping test*
32	*Install pumping well*
33	*Conduct pumping test*
34	*Analyze pumping test data*
35	*Install add'l GW monitoring wells (if necessary)*
36	*Ground-water modeling*
37	
38	Task 6: Risk Assessment
39	Identification of constituents of concern
40	Exposure assessment
41	Toxicity assessment
42	Risk characterization
43	Baseline risk assessment report
44	SNP review of baseline report
45	Revise report
46	Calculation of target cleanup levels
47	
48	Task 7: Selection of Cleanup Standards



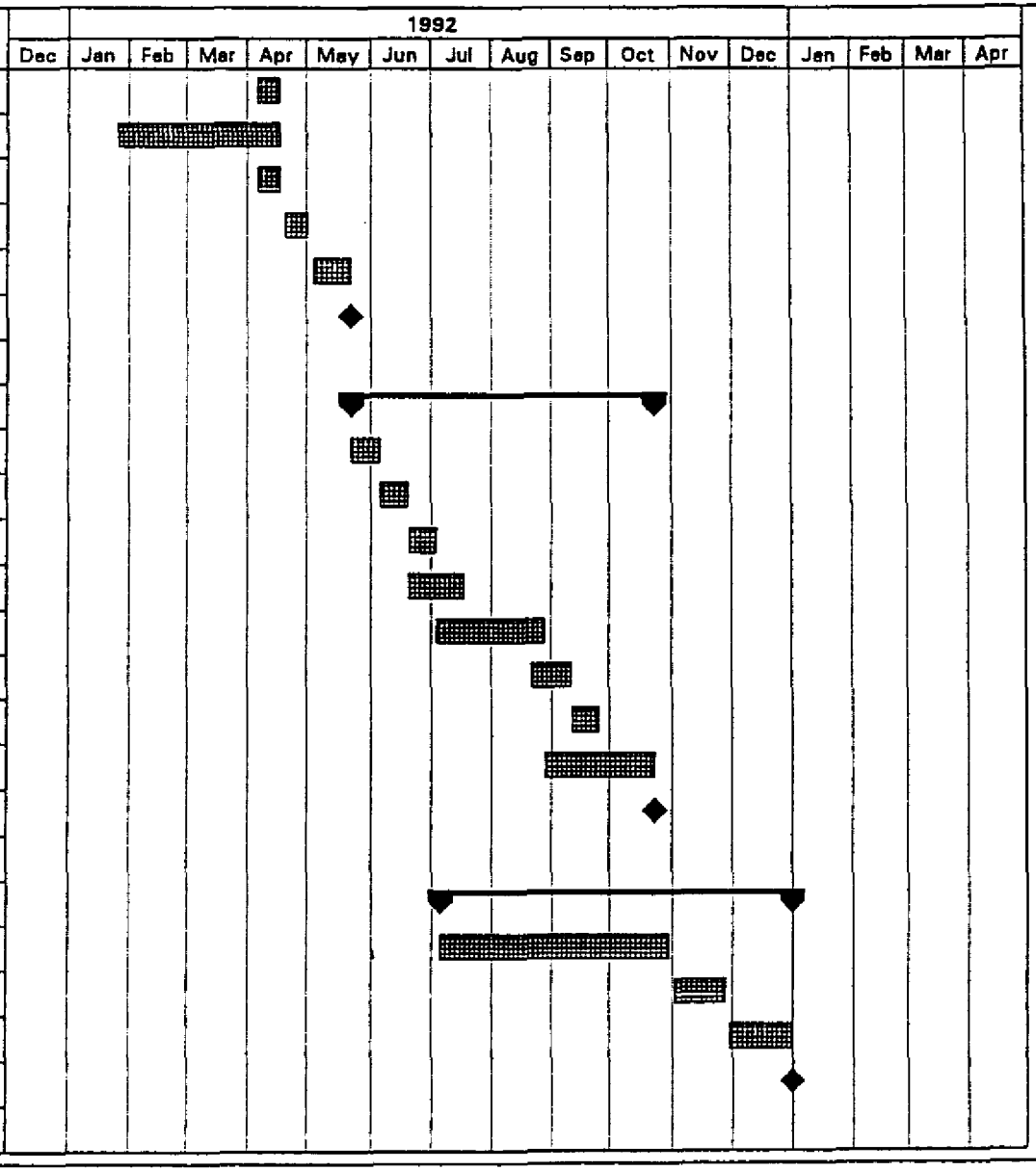
Project: RI/FS
Date: 12/2/91

Critical
Noncritical
Progress
Milestone
Summary

Italicized tasks are not budgeted with this project

PRELIMINARY SCHEDULE FOR RI/FS
Siemens Nuclear Power Corporation
Richland, Washington

ID	Name
49	Identification and evaluation of cleanup levels
50	Identification of applicable state and federal laws
51	Identification and evaluation of compliance points
52	Analysis of cleanup standard options
53	Prepare letter report outlining options
54	Select cleanup standard
55	
56	Task 8: Selection of Remedial Alternative
57	Establish remedial objectives/response actions
58	Identification of technologies to attain objectives
59	Development of alternative remedial actions
60	Prelim analysis wrt MTCA/NCP
61	Detailed analysis of remaining alternatives
62	Comparitive analysis according to NCP criteria
63	Select/recommend alternative
64	Prepare FS portion for RI/FS report
65	Task 8 complete
66	
67	Task 9: RI/FS Report
68	Prepare draft report
69	SNP review of draft RI/FS report
70	Revise RI/FS report
71	Issue RI/FS report
72	



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